EFFECTIVENESS OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION ON IMPROVING PULMONARY FUNCTION IN BRONCHIAL ASTHMA

Dissertation work submitted to

THE TAMIL NADU DR. M. G. R. MEDICAL UNIVERSITY,

Chennai-32

towards partial fulfillment of the requirements of

MASTER OF PHYSIOTHERAPY

Degree programme

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ABSTRACT

Study Objective: To examine the effectiveness of PNF along with conventional therapy in improving Lung function in Bronchial asthma.

Participants: 40 subjects with chronic asthma were selected. They were divided into control group and experimental group with 20 patients each.

Outcome measure: The outcome measurement is done by peak expiratory flow meter (PEFM) and Borg dyspnea scale (MRC) and inch tape.

Result: Both groups showed significant improvement in lung function after the therapy program .The experimental group showed a statistically significant improvement in pulmonary function when compared to the control group at 5 % level of significance.

Conclusion: Treatment with PNF along with conventional physiotherapy showed a significant improvement in Thoracic expansion, PEFR and dyspnea than control group. A well designed trial is needed to study the effectiveness of PNF in improving lung function in a large group and to know its long term effect.

Keywords: PNF, Chronic Asthma, Dyspnoea, PEFR, Thoracic expansion.

ACKNOWLEDGEMENT

I thank **The Almighty God** who laid the foundation for knowledge and wisdom and has always been my source of strength and inspiration and unseen guidance throughout the completion of work.

I express my sincere gratefulness to our Chairman **Dr.L.P.THANGA VELU, M.S., F.R.C.S.,** and our correspondent **Mrs. SHANTHI THANGAVELU, M.A**., P.P.G group of institutions, Coimbatore, for their encouragement and providing the source for the successful of the study.

I express my sincere thanks to my principal **Prof.K.RAJA SENTHIL M.P.T (Cardio-Resp),.MIAP.,PhD.** Principal of P.P.G.College of physiotherapy who extend his guidance and encouragement throughout this project.

I whole heartedly acknowledge from the depth of my heart to our class co-ordinator **Assistant Prof RAJESH KANNAN MPT (Ortho)**, **MIAP.**

It is my pleasure and privilege to express my gratitude to all staff and librarian in the physiotherapy department who helped me to complete this thesis work.

It is with pleasure that I express my sincere thanks to my parents, wife, my sister and my in-laws for their kind co-operation in making this work a success.

I also express sincere thanks to all my classmates for their constant encouragement to fulfill this works. I honour all my patients for their magnanimity to comply with this study.

Dissertation work entitled

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Dissertation submitted to

THE TAMILNADU DR. M. G. R. MEDICAL UNIVERSITY,

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Project work evaluated on ----------

Internal Examiner External Examiner

CERTICATE I

This is to certify that the dissertation work entitled **EFFECTIVENES PROPRICEPTIVE NEUROMUSCULAR FACILITATION ON IMPROVING PULMINAORY FUNCTION IN BRONCHIAL ASTHMA** Was carried out by **Reg. no.27102322** P.P.G College of physiotherapy, Coimbatore-35, affiliated to The Tamilnadu Dr. M.G.R medical university, Chennai-32, under the my guidance.

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Principal

CONTENTS

LIST OF GRAPHS

LIST OF TABLES

CHAPTER-I

1.1 INTRODUCTION

Asthma is a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role. In susceptible individuals, inflammation causes recurrent episodes of wheezing, breathlessness, chest tightness and cough partially at night and early morning. These episodes are usually associated with wide spread but variable out flow obstruction that is often reversible either spontaneously or with treatment.

Asthma is an inflammatory disorder of the airway in which many cells and cellular elements plays a critical role.

Asthma is a disease of airway that is characterized by increased responsiveness of tracheal -bronchial tree to a multiplicity of stimuli.

American thoracic society (1987) defined asthma as a lung disorder with following characteristics:

- Airway obstruction that is reversible either spontaneously or with treatment.
- Increase airway responsiveness to a variety of stimuli.

This definition has changed the focus of attention towards the importance of airway inflammation from the previous belief of primary bronchial constriction.

Asthma is chronic disorder of the chest leads neuromuscular skeletal changes and thereby affecting the neurological physiology of respiration.

.

Respiratory system which is naturally controlled by chemical and neural receptors. In diseased state the reduced neural receptors functions leads to decreased neuromuscular activity and properioceptive activity of thoracic cage. These new neuromuscular skeletal and proprioceptive factors lead to reduced respiratory movement and its function.

Managing asthma is a challenging situation when it is acute or chronic. Naturally the

management of these patients needs a multidisciplinary team approach.

The cost of bronchial asthma to the Australian community in 1991 was estimated to the up to 720 million of this cost to absenteeism in workers with bronchial asthma.

Public interest in non-pharmacological treatments of bronchial asthma. The Australian physiotherapy association contents that physiotherapy management of bronchial asthma in conjunction with a multidisciplinary team can reduce the coast burden and side effects.

There is a high prevalence of asthma in the community, which has significant social and economic costs. There is asthma evidence that appropriate exercise training and self management can reduce the burden of this disease.

In multidisciplinary team, physiotherapy play a vital role .Especially in Asthma, there is a repeated acute stages affecting in respiratory apparatus.

Physiotherapy prevents, maintains and improves the pulmonary function of the asthma patients. In that proprioceptive neuromuscular facilitation(PNF) gives a multidimensional activity of respiratory system may improves functions of respiratory system.

Even with advancement of physiotherapy, we need a further research work on PNF on asthma patients.

1.2. NEED OF STUDY

In moderate to severe level of asthma disease, the severity significantly impairs the quality of life. Asthma in adult subject recognized to the poor quality of life.

So for the most burdening condition it can be treated by wide of intervention like bronchodilators therapy, diaphragmatic breathing exercise etc, here we concern about the treatment the proprioceptive neuromuscular facilitation.

Hence there is a need was felt to do further research work on PNF in improving pulmonary function if asthma patient

1.3. OPERATIONAL DEFINITION

Asthma

Asthma is a clinical syndrome characteristic by wheezing and breathlessness and chest tightness**.(Tidy's physiotherapy)**

Dyspnea

Shortness of breath, a subjective difficulty or distress in breathing, usually associated with disease of the heart or lungs; occurs normally during intense physical exertion or at high altitude**. (Lippincott Williams & Wilkins)**

Peak expiratory flow rate

The peak expiratory flow rate measures how fast a person can breathe out (exhale) air. It is one of many tests that measures how well the lungs are working**.(Andrew Schriber)**

PNF Technique

Neurophysiologic facilitation is the terminology used to describe externally applied proprioceptive and tactile stimuli that produce reflex respiratory movement responses and that appear to alter the rate and depth of breathing. **(Delva D Bethune 1976)**

1.4. AIM OF THE STUDY

To study the effectiveness of **Proprioceptive neuromuscular facilitation techniques** on improving pulmonary function in bronchial asthma.

1.5. OBJECTIVE OF THE STUDY

- To evaluate the effectiveness of PNF in asthmatics patient
- To find out the effectiveness of PNF on improving dyspnea in asthmatic patient.
- To find out the effectiveness of PNF on improving Thoracic expansions in asthmatic patient.
- To find out the effectiveness of PNF on improving peak expiratory flow volume (PEFR) in asthmatic patient.

1.6. HYPOTHESIS

Null hypothesis

There is no significant difference of PNF technique on improving dyspnea in asthma patient.

There is no significant difference of PNF technique on improving thoracic expansion in asthma patient.

There is no significant difference of PNF technique on improving PEFR in asthma patient.

Alternate Hypothesis

There is significant difference of PNF technique on improving dyspnea in asthmatic patient.

There is significant difference of PNF technique on improving thoracic expansion in asthmatic patient.

There is significant difference of PNF technique on improving PEFR in asthmatic patient.

CHAPTER-II

REVIEW OF LITERATURE

Myers TR, Tomasio L .et.al. (2011)

Asthma is a multifactorial, chronic inflammatory disease of the airways. The knowledge that asthma is an inflammatory disorder has become a core fundamental in the definition of asthma. Asthma's chief features include a variable degree of air-flow obstruction and bronchial hyper-responsiveness, in addition to the underlying chronic airways inflammation. This underlying chronic airway inflammation substantially contributes to airway hyper-responsiveness, air-flow limitation, respiratory symptoms, and disease chronicity.

JuMukherjee AB, Zhang Z .et.al. (2011)

Allergic asthma is a chronic airway inflammatory disease in which exposure to allergens causes intermittent attacks of breathlessness, airway hyper-reactivity, wheezing, and coughing. Allergic asthma has been called a "syndrome" resulting from a complex interplay between genetic and environmental factors. In asthma, an initial exposure to allergen results in T(H)2 cell-dependent stimulation of the immune response that mediates the production of IgE and cytokines. Re-exposure to allergen then activates mast cells, which release mediators such as histamines and leucocytes that recruit other cells, including T(H)2 cells, which mediate the inflammatory response in the lungs.

Jeanne E. Moorman.MS et.al. (2007)

Asthma is an chronic respiratory disease with episodic symptoms, increased in prevalence during 1980--1996 in the United States. Asthma has been the focus of numerous provider interventions (e.g., improving adherence to asthma guidelines) and public health interventions during recent years. Although the etiology of asthma is unknown, adherence to medical treatment regimen and environmental management should reduce the occurrence of exacerbations and lessen the hardship of this disease. CDC has outlined a public health

approach to asthma that includes comprehensive analyses of national surveillance data on prevalence, health-care use and mortality, and a strategy to improve

ORC Macro et al 2004

Asthma is an chronic inflammatory lung disease characterized by recurrent episodes of breathlessness, wheezing, and coughing. From 1980 through 1996, the number of Americans afflicted with asthma more than doubled to almost 15 million. Learning how to manage asthma as a chronic disease is a major challenge for people with asthma and their families. Naturally the management of these patients needs a multidisciplinary team approach .In multidisciplinary team physiotherapy play a vital role in Asthma.

A Huntely .et.al (2001)

Bronchial asthma is an multifactorial disease in which environmental, infectious, allergic, and psychological elements all play a part. There is evidence that emotional stress can either precipitate or exacerbate both acute and chronic asthma. Whatever precipitates an asthmatic attack, anxiety is likely to accompany it. So that identification risk factor of asthma is very important when treating the asthma patients.

Lee Larungrayab.D .et.al (2009)

Chest physical therapy like proprioceptive neuromuscular facilitation has an important role in a medical team to assist in resolving the critical problems deriving from chronic lung disease. The inability to be weaned off a ventilator does not only result from secretion production or muscle weakness, but other conditions including chest stiffness or immobility. The procedure to increase chest mobility includes specific chest stretching and mobilizations are useful for improving the pulmonary function and chest expansion.

Putt MT, Watson m (2008)

Chest muscle stretching techniques increase the vital capacity and range of motion in asthma patient. The hold and relax technique to the pectoralis major compared with the sham technique produced significant effects on vital capacity and upper-limb range of motion. Here

was no significant effect on perceived dyspnea, or respiratory rate. So the stretching techniques very useful for improving the vital capacity of asthma patient.

R. Revelette, S. Reynolds .et.al (1992)

Their results indicate that increases in the activity of diaphragmatic tendon organs are associated with moderate increases in abdominal pressure and are likely the result of elevations in the active tension developed by the diaphragm. Combined with results from previous studies, it is possible that diaphragmatic tendon organs may play a role in the attenuation of respiratory muscle activation when abdominal pressure is increased.

Jeremy Weedon PhD et al (2007)

Thoracic respirathoracic respiratory excursion is one such measurement of mobility. It is useful in diagnosing and evaluating asthma, chronic obstructive pulmonary disease (COPD), and thoracic scoliosis. In most of the asthma patient the thoracic expansion is less due impaired chest mobility .Its measured by inch tape in the three region of chest like axilla level, nipple level and xphoid process level. Chest expansion measurement is very useful for find out the prognosis of asthma when treating the asthma patient.

Romagnoli . I et al (2011)

Chest wall displacement was in proportion to increased ventilation. Chest wall dynamic hyperinflation nor dyssynchronous breathing were major contributors to dyspnea. Chest wall expansion and ventilation were adequately coupled with each other.

Montaldo et al (2000)

The greater thoracic expansion might improve the length tension ration of the respiratory muscle decrease the afferents stimuli for central respiratory control and reduce the dysponea.

Compel and Howell (1990)

In Asthma the mechanism of the lung or thoracic cage are affected. So the anterior and posterior diameter of the chest wall is less in asthma patient.

Daniel R Neuspiel .et.al (2011)

The efficacy of peak flow rate monitoring for improving asthma outcome. Most studies have shown a benefit when peak flow rate monitoring is linked to a comprehensive program, combined with symptom diaries and patient education.

Gregory sawacki, lienan haver .et.al (2010)

Peak expiratory flow measurement is a simple and inexpensive means of monitoring airway responsiveness, However peack flow monitoring is affect technique dependent, and there are concern with patient compliance and accounts reporting of peak flow data.

J.Stephen Huff .et.al (2001)

Peak expiratory flow rate (PEFR) assessment or other spirometric measures were useful in clinical decision-making for patients with acute exacerbations of asthma. PEFR may aid emergency physicians during their evaluation and treatment of an adult patient with an acute exacerbation of asthma. Now days PEFR in measured by Wright expiratory flow meter. With help of the values of expiratory flow meter we can find out the severity of asthma.

Parente AA, March MF .et al.(2011)

Seven factors appeared to measure three dimensions of dyspnea: **sensory** (difficulty breathing and phase of respiration, depth and frequency of breathing, urge to breathe, wheeze), **affective** (chest tightness, anxiety), and **behavioural** (refraining from physical activity) dimensions. Difficulty breathing and phase of respiration occurred more often in COPD, followed by asthma Urge to breathe was unique for patients with medically unexplained dyspnea . Wheeze occurred most frequently in asthma, followed by COPD and

heart failure . Chest tightness was specifically linked to medically unexplained dyspnea and asthma . Anxiety characterized medically unexplained dyspnea . Refraining from physical activity appeared more often in heart failure, pulmonary vascular disease, and asthm

Scano et al (2010)

They mention that unsatisfied inspiration are the dominant qualitative descriptors in patients with a variety of respiratory diseases. It is possible that sensory feedback from a multitude of mechanoreceptors throughout the respiratory system collectively convey information to the consciousness that volume/flow or chest wall displacement is inadequate for the prevailing respiratory drive. The data would lend support to the idea that: (i) an altered afferent proprioceptive peripheral feedback signals that ventilatory response is inadequate to the prevailing motor drive, reflecting neuromechanical uncoupling (ii) mechanical constraints on volume expansion play a pivotal role in dyspnea causation in patients with asthma

Furgał M, Nowobilski R, et al (2009)

A relationship can be observed between the functioning of the asthmatic patient's family and the severity of the patient's declared dyspnea. Dyspnea constitutes a specific form of emotional communication in the inter-spouse relationships. An analysis of the severity of dyspnea in asthmatic patients should take into account the context of the functioning of the patient's family.

Kahisali et all (1999)

The elongation of the respiratory muscle might improve the thoracic expansion and decrease dysponea in Asthma patient..

Prasad et al 2000

The usual means of assessing the subjective elements of breathlessness are the modified Borg scale of perceived breathlessness.

CHAPTER-III

MATERIAL AND METHIDOLOGY

3.1. MATERIL USED

- Low couch
- Pillows
- Chair
- Foot stool
- Assessment chat
- Inch tape
- Wright's peak flow meter
- Dysponea scale

3.2. METHIDOLOGY

3.2.1. Study deign

A comparative study with pretest and post test.

3.2.2. Sampling deign

The randomized sampling techniques was used in this study.

3.2.3. Sample size

The sample size consists of 40 subjects with asthma.

3.2.4. Criteria for selection

Inclusion criteria.

- male patient
- Age group 40 to 50 years
- Sub acute and chronic asthma patient
- Co-operative subjects

Exclusion Criteria

- Patient with cardio pulmonary pathology of cor- pulmonae
- Subject with infected lung disease like TB
- Cardiovascular disease
- Cognition impairment
- Loco motor disability
- Pregnancy

3.2.5. Study setting

The study was conducted at

1) Ashwin hospital, kovai

2) Kovai Respiratory care centre, Coimbatore

3.2.6. Study method

The sample size consists of 40 subjects with asthma were selected and assigned in to two groups:

1)Controlled group

2) Experimental group

3.2.7. Duration of the study

Duration of the treatment for one patient is 3 weeks. And total duration of study was 5 month.

3.2.8. Parameters

- Wright's peak expiratory flow meter
- Inch tape
- Borg scale

3.2.9. Statiscal tools

All the statically analysis were done using student-test.

The formula for the t test

t-test

$$S = \sqrt{\frac{\Sigma d^2 - \left[\frac{\Sigma d}{n}\right]^2}{n-1}}$$

$$t = \frac{\overline{d}\sqrt{n}}{s}$$

d = difference between the pre and post test

$\overline{d}$ = mean difference

n = Total number of subjects

S = Standard calculation.

The unpaired t-test f was used to compare statically significant difference in the dependent valuables between the two groups.

Unpaired 't'test

$$S = \sqrt{\frac{\Sigma (x_1 - \bar{x}_1)^2 + \Sigma (x_2 - \bar{x}_2)^2}{n_1 + n_2 - 2}}$$

$$t = \frac{\bar{X}_1 - \bar{X}_2}{s} \sqrt{\frac{n_1 n_2}{n_1 + n_2}}$$

n_1 = Total number of subject in controlled group

n_2 = Total number of subject in experimental group

$\overline{x_1}$ = Mean of control group

$\overline{x_2}$ = Mean of experimental group

S = Standard deviation

3.2.10. Techniques

FOR CONTROL GROUP

1.Chest mobility exercise

To mobilize one side of the chest:.

While sitting, the patients bends away from the tight side to lengthen tight structures and expand that side of the chest during inspiration. Then, have the patient push the fisted hand into the lateral aspect of the chest, as he bends toward the tight side and breathes out. Progress by having he patient raise the arm on the tight side of the chest over the head and side bend away from the tight side and repeat for 10 times.

To mobilize the upper chest and stretch the pectoralis muscles.

The patient is seated in a chair with hands clasped behind the head, and horizontally abduct the arms (elongating the pectoralis muscles) during a deep inspiration

2.Diapharamatic breathing exercise

Patients sit comfortably, with loose garments. Place one hand on chest and one on stomach. Asked the to Slowly inhale through nose or through pursed lips (to slow down the intake of breath).while inhale, push belly/ stomach out and feel the stomach expand with hand.Sowly exhale through pursed lips to regulate the release of air while squeezing stomach. Repeat for 5 times.

3.Relaxation position

Educate the patients regarding the relaxed positions to be adopted during an attack of breathlessness.

- Unassisted Standing Positions
- Unassisted Standing Positions
- Unassisted Sitting Positions
- Assisted Sitting Positions
- High Side Lying

FOR EXPERIMENTAL GROUP

1.Perioral pressure

Perioral stimulation is provided by applying firm maintained pressure to the upper lip. Pressure is maintained for 5 second and repeated for 10 times

Observation:

- increased epigastric excursion
- deep breathing
- sighting
- swallowing
- spout phenomena

2. Vertebal pressure

Manual pressure is applied with the open hand directly over the upper most thoracic vertebrae to lower thoracic vertebrae. A pressure is maintained for 10 second and repeats it for 10 times.

Observation:

- increased epigastria excursion
- deep breathing

3. Anterior stretch basal lift:

Patient in supine position hands under posterior lower ribs and the lift gently upward and the stretch is maintained for 10 seconds

Observation

- Expansion posterior or basal area of chest
- The increased epigastric movement

4. Co- contraction of abdomen

This is performed by the therapist placing one hand on the patient's lower ribs and one on the pelvis same side and pushing with moderate pressure and is maintained for 10 seconds .The same procedure also doing in the opposite side also. An repeat for 10 times.

Observation

- Increased epigastric movement
- Increased muscle contraction
- Depression umbilicus

5. Stretching of pectrolis muscle

Instruct participant to sit on floor or bench and place hands behind head, facing forward. Stand behind participant and position leg behind their head. Place hands on participant's elbows.

Execution

- Pull patient elbows back. Hold stretch for 5 second and repeat for 5 times.

6. Intercostal stretch

This is produced by applying pressure to the upper border of ribs in order to stretch the intercostal muscle in a downward direction. Stretch position is maintained for 5 sercond and repeat for 10 times.

Observation:

- Increased movement of the area being stretch

7. Moderate manual pressure

The patient is in forward lean position with their arm supported high on pillow and their head resting on their arms for comfort. Mild pressure of the open hand is maintained over the posterior chest wall and maintain for 15 second. Repeat for 10 times.

Observation

- Increased movement of the area being stretched

3.2.11. Treatment Procedure

Total number of 30 patients who satisfies inclusion criteria was recruited for the study. Before starting the treatment general cardio respiratory assessment was takes from all the patient.

In addition dysponea rating through modified Borg scale, chest expansion, peak flow expiratory rate also measured for the all patients. Instruction is given to the patient about the treatment procedure.

The total number 40 subjects were separated into two groups control group and experiment group. The control group underwent the conventional physiotherapy like breathing exercise, relaxation techniques, and chest mobility exercise. The experimental group under went conventional physiotherapy and PNF techniques.

Chest expansion is measured in the three region of chest .They are

(i) Axilla level

(ii) Nipple level

(iii) Xyphoid process level

The peach expiratory flow rate is calculate by Wright peak expiratory flow meter. To perform a peaks expiator flow:-

- stand up straight
- make sure the indicator is at the bottom of the meter

- Take the deep breath filling your lung completely.
- Place the mouth piece in your mouth, brightly bite with your teeth, and close your lips on it.
- Blast the air out as hard and as fast as possible in a single blow.
- Record the numbers that appear on the meter
- Repeat these step three times and recording the highest of the three readings in on asthma diary.

The post test value of dyspnea, chest expansion, PEFR from both groups are recorded and documented. And the data was interpreted for statistical analysis.

CHAPTER-IV

DATA PRESENTATION

TABLE-1

DATA REPRESENTATION DYSPNEA IN CONTROLLED AND EXPERIMENTAL GROUP

S. No	CONTROLLED GROUP		EXPERIMENTAL GROUP	
	Pre test	Post test	Pre test	Post test
1.	5	3	6	1
2.	7	5	8	3
3.	8	5	10	4
4.	8	6	7	2
5.	6	4	9	3
6.	7	5	5	0.5
7.	9	6	5	0.5
8.	6	4	6	0.5
9	10	7	8	4
10.	5	3	7	2
11.	5	3	8	3
12.	10	8	10	4
13.	8	5	7	2
14.	7	4	6	2
15.	8	5	5	0.5
16.	8	4	8	3
17.	5	3	7	2
18.	5	2	7	2
19.	6	4	9	3
20.	7	4	9	3

DATA REPRESENTATION OF CHEST EXPANSION AT LEVEL OFAXILLA IN CONTROLLED AND EXPERIMENTAL GROUP

TABLE-2

S. No	CONTROLLED GROUP		EXPERIMENTAL GROUP	
	Pre test	Post test	Pre test	Post test
1.	85	86	86	89
2.	88	90	87	90.5
3.	86	87.5	85	89.5
4.	89	90.5	90	94.5
5.	92	93.5	92	95.5
6.	90.5	91.5	86	89.5
7.	91	92	88	92
8.	95	96.5	93	96
9	88	89.5	94.5	98
10.	87.5	88.5	92	94.5
11.	93	94	89.5	95.5
12.	89	90	91	95
13.	89.5	91	91	95
14.	94	95.5	95.8	99.5
15.	94.5	96.5	95	99
16.	93	94.5	89.5	93.5
17.	87	88.5	92	94.5
18.	90.5	92.5	93.5	97.5
19.	88	89.5	86	90.5
20.	93	94	90	94

DATA REPRESENTATION OF CHEST EXPANSION AT LEVEL OF NIPPLE IN CONTROLLED AND EXPERIMENTAL GROUP

TABLE-3

S. No	CONTROLLED GROUP		EXPERIMENTAL GROUP	
	Pre test	Post test	Pre test	Post test
1.	81	82.5	82	87
2.	84	86	81	87
3.	82	83.5	79	83.5
4.	86.5	88	83	88
5.	88	90	88	92
6.	85.5	87	82	87
7.	86	88.5	82.5	87
8.	89.5	91	88	92.5
9	84	86.5	89	93
10.	81	83	85	89
11.	88.5	90.5	84.	90
12.	85.5	87	85	90
13.	85	87	85	91
14.	88.5	90	93.5	98.5
15.	90	92.5	89	95
16.	93.5	95	83.5	87.5
17.	82	85	92	96
18.	84.5	86	86.5	91.5
19.	83	85	81	86
20.	88	91	85	90

DATA REPRESENTATION OF CHEST EXPANSION AT LEVEL OF XPHOID IN CONTROLLED AND EXPERIMENTAL GROUP

TABLE-4

S. No	CONTROLLED GROUP		EXPERIMENTAL GROUP	
	Pre test	Post test	Pre test	Post test
1.	77	79	79	84
2.	80	81	77.5	81
3.	78	80	75	79.5
4.	82	83.5	81	85.5
5.	84.5	86	84.5	89
6.	81	83.5	78	83
7.	82.5	84.5	78.5	83
8.	85.5	87	84	87.5
9	80	82	85.5	89
10.	77	79	80	83
11.	82.5	85	81	83.5
12.	81	83	82	86
13.	81	82.5	82.5	86
14.	84.5	86.5	90	93
15.	85	87	86.5	89
16.	90.5	92	80	83.5
17.	79.5	81.5	90.5	94
18.	80	82	83	87
19.	80.5	83	78.5	82.5
20.	84	86	92	96

DATA REPRESENTATION OF PEFR IN CONTROLLED AND EXPERIMENTAL GROUP

TABLE-5

S. No	CONTROLLED GROUP		EXPERIMENTAL GROUP	
	Pre test	Post test	Pre test	Post test
1.	260	300	270	360
2.	310	350	260	340
3.	280	320	300	450
4.	270	330	260	340
5.	300	350	250	330
6.	250	300	290	380
7.	270	330	300	400
8.	290	340	290	380
9	300	350	290	370
10.	280	320	280	360
11.	290	330	260	350
12.	300	340	260	350
13.	250	310	270	360
14.	270	330	280	380
15.	250	320	290	380
16.	280	340	260	360
17.	290	340	250	350
18.	290	350	280	370
19.	260	320	260	360
20.	270	320	290	390

CHAPTER-V

DATA ANALSIS AND INTERPRETATION

TABLE-6

PRE AND POST TEST VALUE OF DYSPNEA IN CONTROLLED GROUP

S. No	Controlled group	Mean	Standard Deviation	't' Value
1.	Pre test	7	0.32	34.92
2.	Post test	4.5		

The calculated **'t'** value between pre versus post exercise session of controlled group was 34.92 at 0.05% which is greater than tabulated value (2.095). The result showed that there is a significant difference in pre and post test values.

TABLE-7

PRE AND POST TEST VALUE OF DYSPNEA IN EXPERIMENTAL GROUP

S. No	Experimental group	Mean	Standard Deviation	't' Value
1.	Pre test	7.35	0.64	35.62
2.	Post test	2.25		

The calculated **'t'** value between pre versus post exercise session of experimental group was 35.62 at 0.05% which is greater than tabulated value (2.095). The result showed that there is a significant difference in pre and post test values, and also controlled group value.

TABLE-8

POST TEST VALUE OF DYSPNEA IN CONTROLLED AND EXPERIMENTAL GROUP

S. No	High Intensity group	Mean	Standard Deviation	't' Value
1.	Pre test	4.5	1.31	5.42
2.	Post test	2.25		

The calculated **'unpaired t'** value between post versus post exercise session of controlled and experimental group was 5.42 at 0.05% which is greater than tabulated value (2.048). The result showed that there is a significant difference.

GRAPH-1

GRAPHICAL REPRESENTATION OF DYSPNEA

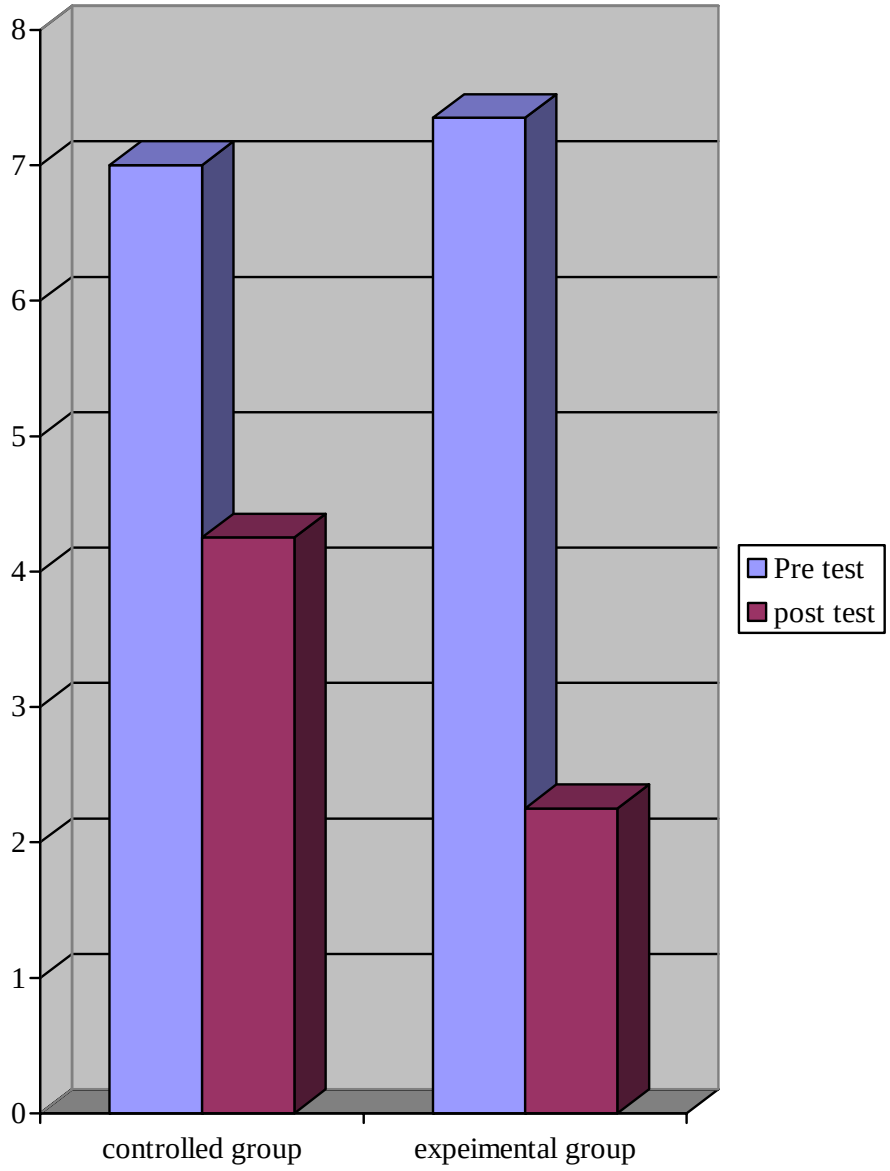


TABLE -9

PRE AND POST TEST VALUE OF CHEST EXPANSION AT THE AXILLA LEVEL IN CONTROLLED GROUP

S. No	Controlled group	Mean	Standard Deviation	't' Value
1.	Pre test	90.5	.34	11.32
2.	Post test	92.5		

The calculated **'t'** value between pre versus post exercise session of controlled group was 11.32 at 0.05% which is greater than tabulated value (2.095). The result showed that there is a significant difference in pre and post test values.

TABLE -10

PRE AND POST TEST VALUE OF CHEST EXPANSION AT THE LEVEL OF AXILLA IN EXPERIMENTAL GROUP

S. No	Experimental group	Mean	Standard Deviation	't' Value
1.	Pre test	90.55	0.77	18.77
2.	Post test	94.38		

The calculated **'t'** value between pre versus post exercise session of experimental group was 18.77 at 0.05% which is greater than tabulated value (2.095). The result showed that there is a significant difference in pre and post test values and also pre test value.

TABLE -11

POST TEST VALUE OF CHEST EXPANSION AT THE LEVEL OF AXILLA IN CONTROLLED AND EXPERIMENTAL GROUP

S. No	Group	Mean	Standard Deviation	't' Value
1.	Controlled group	92.5	3.38	2.59
2.	Experimental group	94.38		

The calculated **'t'** value between post versus post exercise session of controlled group and experimental group was 2.59 at 0.05% which is greater than tabulated value (2.021). The result showed that there is a significant difference.

GRAPH-2

GRAPHICAL REPRESENTATION OF CHEST EXPANSION IN THE AXILLA LEVEL

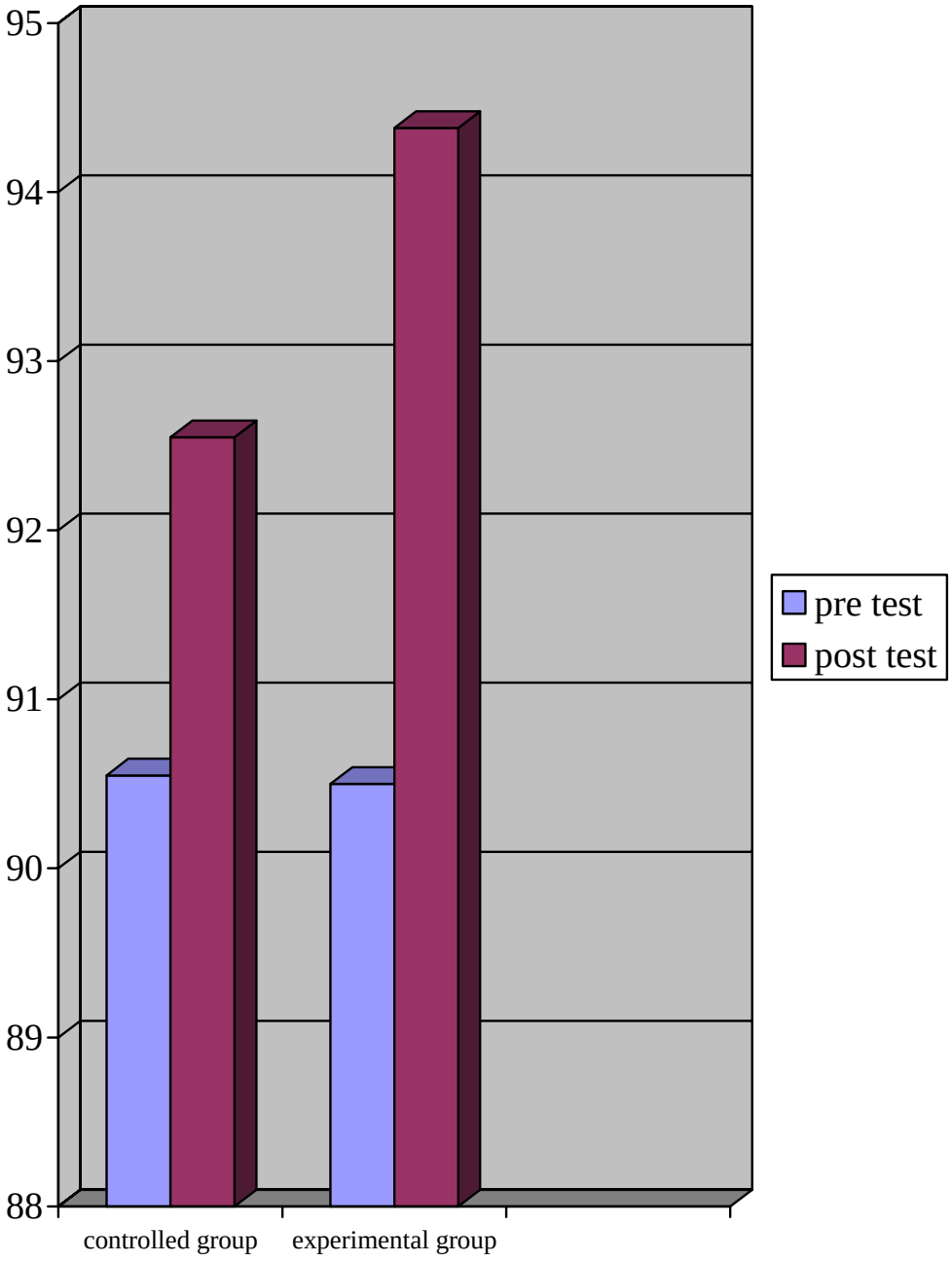


TABLE -12

PRE AND POST TEST VALUE OF CHEST EXPANSION AT THE LEVEL OF NIPPLE IN CONTROLLED GROUP

S. No	Controlled group	Mean	Standard Deviation	't' Value
1.	Pre test	85.95	0.54	17.19
2.	Post test	87.75		

The calculated **'t'** value between pre versus post exercise session of controlled group was 17.19 at 0.05% which is greater than tabulated value (2.095). The result showed that there is a significant difference in pre and post test values

TABLE -13

PRE AND POST TEST VALUE OF CHEST EXPANSION AT THE LEVEL OF NIPPLE IN EXPERIMENTAL GROUP

S. No	Experimental group	Mean	Standard Deviation	't' Value
1.	Pre test	85.52	.53	37.70
2.	Post test	90.8		

The calculated **'t'** value between pre versus post exercise session of experimental group was 37.70 at 0.05% which is greater than tabulated value (2.095). The result showed that there is a significant difference in pre and post test values.

TABLE -14

POST TEST VALUE OF CHEST EXPANSION AT THE LEVEL OF NIPPLE IN CONTROLLED AND EXPERIMENTAL GROUP

S. No	Group	Mean	Standard Deviation	't' Value
1.	Controlled group	87.75	3.37	2.19
2.	Experimental group	90.0		

The calculated **' unpaired t'** value between post versus post exercise session of controlled and experimental was 2.19 at 0.05% which is greater than tabulated value (2.048). The result showed that there is a significant difference.

GRAPH-3

GRAPHICAL PRESENTATION OF CHEST EXPANSION IN NIPPLE LEVEL

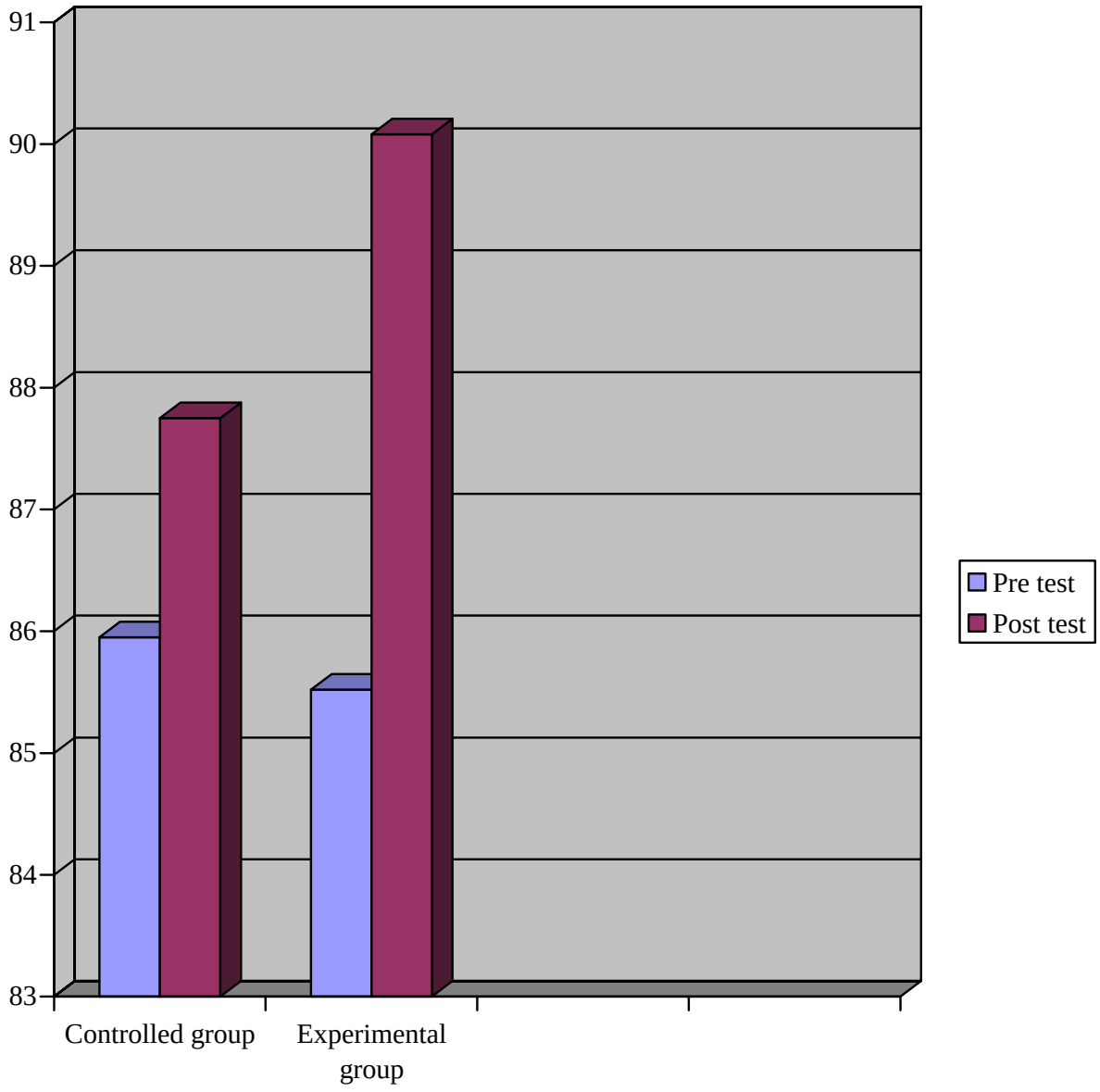


TABLE -15

PRE AND POST TEST VALUE OF CHEST EXPANSION AT THE LEVEL XPHOID PROCESS IN CONTROLLED GROUP

S. No	Controlled group	Mean	Standard Deviation	't' Value
1.	Pre test	81.8	0.43	19.75
2.	Post test	87.8		

The calculated 't' value between pre versus post exercise session of controlled group was 19.75 at 0.05% which is greater than tabulated value (2.095). The result showed that there is a significant difference in pre and post test values

TABLE -16

PRE AND POST TEST VALUE OF CHEST EXPANSION AT THE LEVEL OF XPHIOD PROCESS IN EXPERIMENTAL GROUP

S. No	Experimental group	Mean	Standard Deviation	't' Value
1.	Pre test	82.45	0.73	23.26
2.	Post test	89.8		

The calculated 't' value between pre versus post exercise session of experimental group was 23.26 at 0.05% which is greater than tabulated value (2.095). The result showed that there is a significant difference in pre and post test values.

TABLE -17

POST TEST VALUE OF CHEST EXPANSION AT THE LEVEL OF XPHIOD PROCRESS IN EXPERIMENTAL AND CONTROLLED GROUP

S. No	Group	Mean	Standard Deviation	't' Value
1.	Controlled group	87.8	3.82	2.11
2.	Experimental group	89.8		

The calculated **'unpaired t'** value between post versus post exercise session of controlled group was 2.11 at 0.05% which is greater than tabulated value (2.021). The result showed that there is a significant difference.

GRAPH-4

GRAPHICAL REPRESENTATION OF CHEST EXPANSION IN THE LEVEL OF XPHOID PROCESS

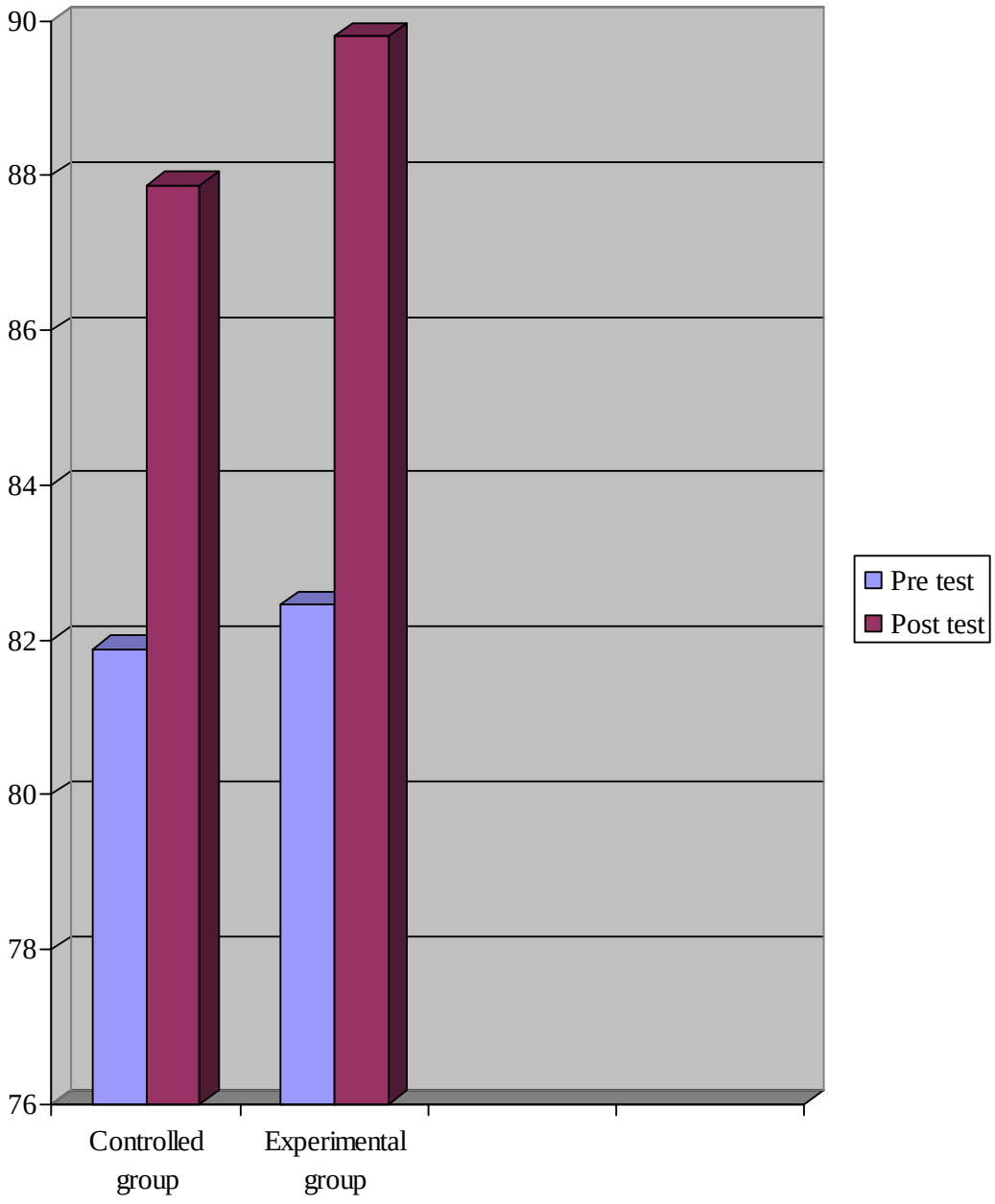


TABLE -18

PRE AND POST TEST VALUE OF PEFR IN CONTROLLED GROUP

S. No	Controlled group	Mean	Standard Deviation	't' Value
1.	Pre test	275	9.33	24.75
2.	Post test	329		

The calculated **'t'** value between pre versus post exercise session of controlled group was 24.75 at 0.05% which is greater than tabulated value (2.095). The result showed that there is a significant difference in pre and post test values

TABLE -19

PRE AND POST TEST VALUE OF PEFR IN EXPERIMENTAL GROUP

S. No	Experimental group	Mean	Standard Deviation	't' Value
1.	Pre test	276	16.05	26.60
2.	Post test	368		

The calculated 't' value between pre versus post exercise session of experimental group was 26.60 at 0.05% which is greater than tabulated value (2.095). The result showed that there is a significant difference in pre and post test values and also controlled group value.

TABLE -20

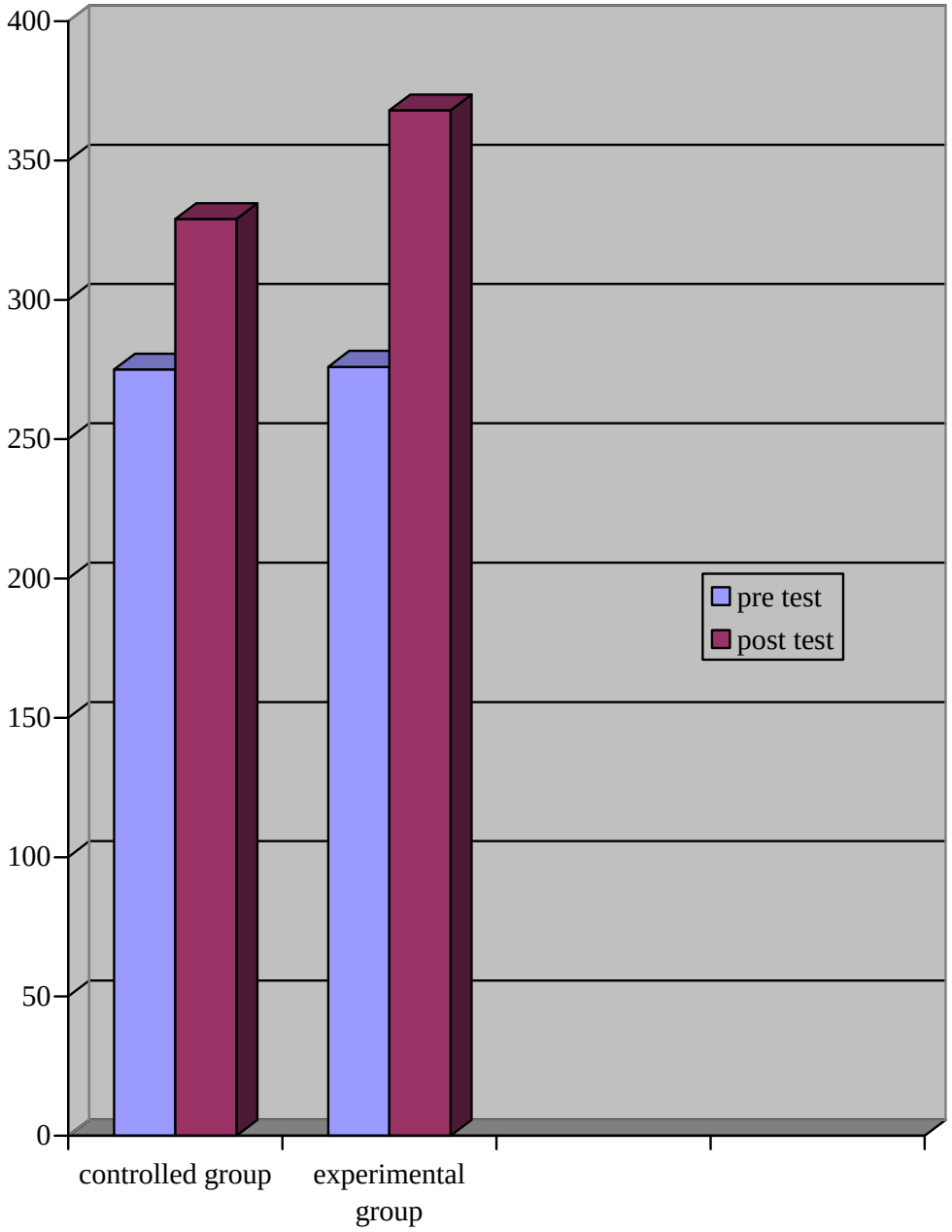
POST TEST VALUE OF PEFR IN EXPERIMENTAL AND CONTROLLED GROUP

S. No	Group	Mean	Standard Deviation	't' Value
1.	Controlled group	329	7.02	17.33
2.	Experimental group	368		

The calculated **'unpaired t'** value between post versus post exercise session of controlled group and experimental was 17.33 at 0.05% which is greater than tabulated value (2.021). The result showed that there is a significant difference.

GRAPH-5

GRAPHICAL REPRESENTATION OF PEFR



CHAPTER-VI

DISCUSSION

Asthma is the most commonest harmful effect of respiratory system, for which pulmonary physiotherapy program is very much essential.

This study was aimed to find out the effectiveness of the PNF on improving pulmonary function on asthma patient. In which shows improvement on dyspnea, chest, expansion and PEFR in asthma patients.

For this study 40 subjects were selected using purposive sampling technique and were assigned into 2 groups, controlled and experimental group with 20 subjects in each.

Control group patient were treated with conventional physiotherapy techniques such as breathing exercise, relaxation position, chest mobility exercise and experimental group were treated with conventional physiotherapy along with PNF techniques like pectorlis stretch, muscle, perioral pressure, intercostals stretch, vertebral pressure, co-contraction of the abdomen, anterior stretch basal lift and manual moderate pressure.

In asthma patient the shape of thorax, posture and lung volumes are often deviate from the normal. The rib cage is held in a position of hyper inflation. This is frequently associated with some degree of thoracic kyphosis. The abdomen is often lax and muscles in the make appear strongly involved with respiration. **Grimby et al** believed that in asthma and chronic lung disease the diaphragm tends to be shortened aggressively, that is to say that as the end respiratory lung volume is increased, the diaphragm tend to be nearly function less in some patient due to its shortening and flattening. **Campbell and Howell** have proposed that length tension in appropriate of respiratory muscles may be a contributing factor to dyspnea.

In controlled group the treatment like breathing exercise, relaxation techniques and chest mobilization exercises are given and the values are documented in the ‘t’ test.

Diapharagmatic breathing exercise strengthen the diaphragm, Decrease the work of breathing by slowing your breathing rate, Decrease oxygen demand, Use less effort and energy to breath. So that dysnea is reduced.

Thoracic mobility exercises combine active movements of the trunk or extremities with deep breathing. These exercises combine stretching of the trunk muscles with deep breathing which improve ventilation and chest expansion

Relaxation position is relive the compression of diapharam and also reduce the anxiety. So that the breathing pattern is improved and dyspnea is reduced.

The main objective of the PNF is to improve the mechanical stability of the respiratory system by effecting a change in posture and to improve the pattern of respiratory muscle by improving the abdominal muscle support to diaphragmatic function and reducing the activity in the muscle of neck.

Perioral pressure as a procedure to reduce the spastic muscle tone **(Marget Rood)** and also improves generalized relaxation. The reduction of spastic muscle tone and improved relaxation causes more air entry into the lung and reduces the severity of dyspnea.

Intercostals stretch produces the gradual increase in respiratory movement in the area under and around it. The stretch thus produced effective in restoring respiratory movement pattern and so to improve the chest expansion of the asthma patient.

Vertebral pressure over the thoracic results improved diaphragmatic activity in response to high thoracic vertebral stimulation and facilitated apical respiratory activity following pressure over the lower thoracic region. The vertebral pressures mainly improve the epical respiratory movement so that the peak expiratory flow right, dyspnea and chest expansion are reduced.

According to **Rood** the co-contraction of the abdomen also activate the diaphragm, abdominal return contractions. As applyed on the both side of abdomen this procedure produced the stretching of abdominal muscles this would activate the muscle spindle and they in turn would cause their homogenous extrafusal muscle to contract. The contraction of these muscles would in turns stretch the abdominal muscle on the other side. Stretch would activate their on extrafusal muscle due to abdominal co-contration, there is increasing tone of the abdomen and the activation of diaphragm is occurred. Thus by ventilation is increased due to this PEFR is also increased.

In Anterior stretch based lift, it results in increasing the movement of the ribs in the lateral and posterior direction which can be seen and felt the thoracic expansion is improved by this stretch.

The pectorlis major muscle stretch also improves the stretch expansion of chest by improving the length of pectorlis muscle. Manual moderate pressure over the posterior chest wall of asthma causes and excitation of inspiratory neuron .According to **Sumi** the expiratory field for the inspiratory motor neurons were more extensive than those of expiratory neurons, more inspiratory neuron can be excited by a single stimulus. So that the breathing pattern is improved and dyspnea also reduced.

In dyspnea ,there is marked improvement in asthma patient after giving the PNF techniques when compare to the controlled group .The severity of dyspnea is less after giving the PNF .After 4 weeks of treatment the dyspnea is measured by Borg scale of dyspnea in both group and the value is applied to the 't' test. Their is marked improvement is found in both controlled and experimental group but greater significant is found experimental group

In asthma patient the expiratory phase is more compare to inspiratory phase .so there is marked reduction of chest expansion in asthma patient .After completing the course of treatment the chest expansion is measured in the three region of chest and the value is statically analyzed. The chest expansion is improved in both group but greater significant is present in experimental group.

Peak expiratory rate also significantly less in asthma patient .Peak expiratory flow rate is measured by Wright's peak expiratory flow meter

CHAPTER - VII

RESULT

The purpose of the study was to examine the effectiveness of the Proprioceptive neuro muscular facilitation improves lung function in patients with asthma. The study used is an experimental study. The population included the patients diagnosed as asthma. Those patients were randomly assigned into control group and experimental group of 20 each. Control group received conventional physiotherapy including breathing exercises, relaxation techniques, and chest mobility exercises. The experimental group received PNF in addition to conventional physiotherapy. Pre-test evaluation was done on the first day prior to treatment and post test evaluation was done on the last day of treatment. The tools selected for measuring the outcome of the study were brog dyspnea scale, Wright expiratory flow meter for peak expiratory flow rate and inch tape for thoracic expansion. The values are statistically analyzed by‘t’ test.

In dyspnea the mean post test score for experimental group 2.25 and mean post test score for experimental group is 7.35.”t” value obtained is 35.62 which statistically significant at 0.05% level. The mean of pretest score for controlled group is 7 and post test score is 4.5 ant ‘value obtained is 34.92 which is statistically significant ta 0.05% level. Post score are greater than the pre values at 0.05% level of significance and also greater in experimental group. Data analysis shows significant improvement in dyspnea rates in experimental groups. This might be due to the cumulative effect of PNF techniques

In chest expansion the mean post test score for experimental group 94.38 and mean post test score for experimental group is 90.55 and ”t” value obtained is 18.77 which statistically significant at 0.05% level. The mean of pretest score for controlled group is 90.5 and post test score is 92.5 ant ‘value obtained is 11.37 which is statistically significant ta 0.05% level. Post score are greater than the pre values at 0.05% level of significance and also greater in experimental group. Data analysis shows significant improvement in chest expansion in experimental groups. This might be due to the cumulative effect of PNF techniques

Chest expansion in the level of nipple the mean post test score for experimental group 87.75 and mean pretest score for experimental group is 85.95 and ”t” value obtained is

16.39 which statistically significant at 0.05% level. The mean of pretest score for controlled group is 85.52 and post test score is 90.08 and the ‘t ‘value obtained is 37.70 which is statistically significant ta 0.05% level. Post score are greater than the pre values at 0.05% level of significance and also greater in experimental group. Data analysis shows significant improvement in chest expansion in experimental groups. This might be due to the cumulative effect of PNF techniques

Chest expansion in the level of process, the mean post test score for experimental group 89.8 and mean pretest score for experimental group is 82.45 and ”t” value obtained is 23.26 which statistically significant at 0.05% level. The mean of pretest score for controlled group is 81.88 and post test score is 87.8 and the ‘t ‘value obtained is 19.75 which is statistically significant ta 0.05% level. Post score are greater than the pre values at 0.05% level of significance and also greater in experimental group. Data analysis shows significant improvement in chest expansion in experimental groups. This might be due to the cumulative effect of PNF techniques

In PEFR, the mean post test score for experimental group 368 and mean pretest score for experimental group is 276 and ”t” value obtained is 26.60 which statistically significant at 0.05% level. The mean of pretest score for controlled group is 275 and post test score is 329 and the ‘t ‘value obtained is 24.75 which is statistically significant ta 0.05% level. Post score are greater than the pre values at 0.05% level of significance and also greater in experimental group. Data analysis shows significant improvement in PEFR in experimental groups. This might be due to the cumulative effect of PNF techniques

In this study prove the PNF and conventional physiotherapy techniques are more effective than conventional physiotherapy techniques. So alternative hypothesis is accepted.

CHAPTER - VIII

CONCLUSION

It can be concluded PNF may be useful in pulmonary rehabilitation of patients with bronchial asthma. This shows the greater potentiality towards the experimental group which indicated the importance of PNF in asthma patients.

CHAPTER - IX

LIMITATIONS AND SUGGESTIONS

Limitations

1. Size of the sample was very small.
2. The study was of short duration.
3. Frequency of attacks was not recorded.
4. The researcher was not able to assess the other psychological parameters of the patients.

Suggestions

1. A large sample size is required to explain more about effectiveness
2. To make the result more valid, a long term study may be carried out.
3. Regular home and follow up program can be included to know the long term effect of treatment.

CHAPTER – X

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CHAPTER – XI

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CHAPTER – XII

APPENDIX I

ASSESSMENT FORM

- Name:
- Age:
- Sex:
- Occupation:
- Chief complaints:
- Address:
- Hospital No.:
- Referred doctor:
- Diagnosis:
- Reason for reference:

HISTORY

- History of present condition:

Onset-

Duration -

Aggravating Factors-(Cause for increase in intensity)-

Alleviating Factors-(Rest, remedial medications-use of inhalers or PUFFS,)-

- Past medical history:
- Personal history:
- Smoking history:
- Family history:
- Psychosocial History:
- Socioeconomic history:

SUBJECTIVE EVALUATION OF CARDINAL SYMPTOMS:

A.DYSPNOEA

On strenuous activity:

On ordinary activity:

At Rest:

B.WHEEZE

Diurnal Variations:

Postural Variations:

Aggravating Factors:

C.COUGH

Productive:

Dry:

Timing (at night, cold air, exercise,):

D.SPUTUM

Colour:

Consistency:

Quantity:

E.EXTRIMITIES

Edema:

Cyanosis:

Clubbing:

OJECTIVE ASSESSMENT:

ON OBSERVATION

- General Appearance-
- Skin-
- Neck-
- Jugular venous pressure-
- Body Built-
- Breathing Pattern:(Abdomino-thoracic or Thoraco –abdominal)-
- Use of accessory muscles-
- Shape of the chest wall-
- Nutritional Status-

VITAL SIGNS

Temperature:

Respiratory rate:

Blood Pressure:

Pulse rate:

ON INSPECTION

A. Breathing pattern:
   - Rate, Depth, Rhythm-
   - Abdominothoracic / Thoracoabdominal-
   - Pursed lip breathing-

B. Chest wall configuration:
   - Pectus excavatum-
   - Pectus carinatum-
   - Flail-
   - Chest expansion-

C. Colour:

D. Symmetry of chest movement:

E. Clubbing fingers:

F. Cyanosis:

G. Intercostals in drawing:

H. Chest wall scars, bruising, signs of trauma:

I. Use of accessory muscles:

ON AUSCULTATION

A. Breath Sounds:

   a. Normal
      - Bronchial
      - Bronchovescicular
      - Vescicular

   b. Abnormal
      - Bronchial
      - Decreased
      - Absent

   c. Adventitious
      - Crackles
      - Wheeze and
      - Rhonchi

B. Voice Sounds
   - Bronchophony

- Egophony
- Whispering Pectoriloquy

C. Extra pulmonary sounds

- Pleural rub
- Stridor

ON PERCUSSION

- Resonant:
- Hyper resonant:
- Dull:
- Flat:

ON PALPATION

- Chest wall Tenderness:
- Edema:
- Respiratory excursion:
- Tactile fremitus:
- Tracheal deviation:
- Peripheral pulse:
- Skin temperature and texture:

INVESTIGATIONS

- Imaging of the chest:
- Pulmonary function test:
- ABG(Blood Gases):
- Sputum Examination:
  - ❖ Colour
  - ❖ Consistency
  - ❖ Volume.

PROBLEM LIST:

TREATMENT PLAN:

APPENDIX – II

PATIENT CONSENT FORM

TITLE: EFFECTIVENESS OF PNF ON IMPROVING PULMONARY FUNCTION IN BRONCHIAL ASTHMA

INVESTIGATOR: _ _ _ _ _ _ _ _ _ _ _

PURPOSE OF THE STUDY:

I_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ ,have been informed that this study will work towards achieving on the functional activities of daily living in post-stroke conditions for me and other patients.

PROCEDURE:

Each term of the study protocol has been explained to me in detail. I understand that during the procedure, I will be receiving the treatment for one time a day. I understand that I will have to take this treatment for four weeks.

I understand that this will be done under investigator, _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ supervision. I am aware also that I have to follow therapist's instructions as has been told to me.

CONFIDENTIALITY:

I understand that medical information provided by this study will be confidential. If the data are used for publication in the medical literature or for teaching purposes, no names will be used and other literature such as audio or video tapes will be used only with permission.

RISK AND DISCOMFORT:

I understand that there are no potential risks associated with this procedure, and understand that investigator will accompany me during this procedure. There are no known hazards associated with this procedure.

REFUSAL OR WITHDRAWL OF PARICIPATION:

I understand that the decision my participation is wholly voluntary and I may refuse participate, may withdraw consent at any time during the study.

I also understand that the investigator may terminate my participation in the study at anytime after researcher has explained me the reasons to do so.

I _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ have explained to ……. the purpose of the research, the procedures required and the possible risks and benefits, to the best of my ability.

…… ……

Investigator Date

I ……. Confirm that researcher has explained me the purpose of the research, the study procedure and the possible risks and benefits that I may experience. I have read and I have understood this consent to participate as a subject in this research project.

…….. ……

Subject Date

…….. …….

Signature of the Witness Date

APPENDIX-III

SCALE FOR DYSNEA:

O – Nothing it all

O.5 - very very slight

1 – very slight

2 – Slight

3 – Moderate

4 – Some what strong

5 – Severe

6 –

7 – very severe

8 –

9 – very very severe

10 –maximum